2014 North Idaho Douglas-fir Tussock Moth Pheromone Trapping Report

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Report No. IDL 14-2
December 2014

2014 NORTH IDAHO DOUGLAS-FIR TUSSOCK MOTH TRAPPING SYSTEM REPORT

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Background and History

There is a long history of periodic Douglas-fir tussock moth (DFTM) outbreaks in northern Idaho. Since 1977 Idaho has participated in the DFTM Early Warning System (EWS) that uses a series of permanent pheromone trap sites to identify increasing populations prior to undesirable tree defoliation, a system modified after Daterman et al. (1979). Trapping monitors the presence of male moths and provides land managers advance warning of an impending outbreak.

Three DFTM outbreaks have been detected in northern Idaho since implementing the EWS. The first outbreak in the 1980's occurred in Latah County and McCroskey State Park. Outbreaks of DFTM have occurred in this general area approximately every 8-10 years since the 1940's (Figure 1). The 2000-2002 outbreak resulted in three years of defoliation on State and private lands between Plummer and Moscow and in adjacent Clearwater National Forest lands. Both outbreaks were preceded by increasing numbers of moth captures (Randall 2002) (Figure 2), and averages were over 40 moths per trap the year before defoliation was observed. The intensity of the two outbreaks was very different in that aerially detectable defoliation was only detected for one year during the 1980's outbreak, while defoliation in the 2000 outbreak was evident for three years. The most recent outbreak between 2010 and 2012 did not follow the same trend in moth captures or location. Defoliation was centered much farther north than

previous outbreaks, with limited defoliation near Moscow Mountain. Most of the defoliation was in Kootenai County near Signal Point, in Benewah County near Plummer, and in McCroskey State Park. In 2010, over 8,500 acres of defoliation was visible by aerial survey and average count of 11.8 moths/trap, a slight decline compared with the 2009 average of 11.9 moths/trap. However, defoliation peaked in 2011 to over 68,500 acres with an average of 43.8 moths/trap, which is an average that would be expected the year prior to observed defoliation. In 2012, an average of 6.3 moths/trap and approximately 31,000 acres of defoliation were detected. This confirms the need for additional population sampling of other life stages.

The EWS is one method for monitoring DTFM adult populations that is supplemented with additional population sampling, such as egg mass and larval sampling to help determine the intensity of outbreaks (Mason and Torgersen 1983, Kegley et al. 2004). Observations of damage to ornamentals are another indicator that outbreaks of DFTM will soon develop in the forest (Sturdevant 2000, Tunnock et. al 1985). Defoliation of spruce was observed at the USFS Coeur d'Alene nursery in 2007 and 2008, and grand fir yard trees were defoliated at Twin Lakes and Mica Flats in 2009 and 2010.

Monitoring Methods

Pheromone Traps

Five pheromone-baited sticky traps are installed along a transect at each site, with a minimum of 75 feet between traps. Traps are placed in young, open-grown host trees (grand fir or Douglas-fir) in late July to early August and are collected in October. The common threshold used to indicate where defoliation may occur in following years is an average of 25 moths/trap at a site.

The Idaho Department of Lands (IDL) maintains trap sites from Coeur d'Alene south to Moscow and east to Harvard (Figure 3). Forest Health Protection, Coeur d'Alene Field Office (USFS-R1), maintains trap sites from Potlatch to Lucille (Figure 4), while Forest Health Protection, Boise Field Office (USFS-R4), maintains trap sites in southern Idaho (Figure 5).

Egg Mass Sampling

When trap captures are high (near moths/trap threshold), egg mass sampling is the best indicator of DFTM population levels and the potential for defoliation the following year. Sampling is completed in the fall, by examining grand fir and Douglas-fir trees for ten minutes, and counting the number of egg masses observed. Sampling sites are selected in defoliated areas and outward to delimit the area of infestation. One plot should be sampled in each section (640 acres) where host material is present and accessible by road access. This was the method used by IDL during the past two outbreaks.

Larval Sampling

At sites where the moths/trap threshold (25 moths/trap) is reached, larval sampling is conducted the following spring to pinpoint injurious population densities (Daterman et al. 1979) and to apply treatments, if necessary. Larval sampling may also be conducted at sites with historic tussock moth problems before trap counts reach the threshold. Sites where trap

catches increased and sites known historically to be infested are usually sampled for larvae the following year, regardless of the actual trap count. Sequential surveys are most useful before widespread defoliation occurs, and are of limited use during an outbreak (Mason 1979).

Results

Trapping

A total of 177 sites were monitored in northern Idaho (146 by IDL and 31 by USFS-R1), and 16 sites were monitored in southern Idaho (USFS-R4) during 2014. Six additional traps were installed in the Boise and Payette National Forests, in an area that experienced a DFTM outbreak during 1990-1992. The overall mean trap capture for the IDL traps in 2014 was 0.02 moths/trap, compared with 0.05 and 6.3 moths/trap in 2013 and 2012, respectively (Figure 4, Appendix 1). The 2014 average trap capture for the USFS-R1 traps was 0.006 moths/trap compared with 0.06 and 0.2 moths/trap in 2013 and 2012, respectively (Appendix 2). The 2014 USFS-R4 average was 3.0 moths/trap compared to 1.8 and 0.8 moths/trap in 2013 and 2012, respectively (Appendix 3). One site near Bellevue, ID had an average of 27.4 moths per trap, indicating potential defoliation in 2015. This site is approximately 15 miles southeast of a DFTM outbreak that occurred west of Hailey in 2005-2006. Average trap captures at IDL sites started to drop dramatically in 2012, and by 2013 the collapse of the outbreak in northern Idaho was complete. Eleven adults were captured at nine of the 146 IDL sites in 2014. By comparison, 31 moths were captured at 23 of the 146 sites in 2013, and 4,407 moths were captured at 118 of 141 sites in 2012.

Larval Surveys

Twenty-six of the sites with the highest 2013 moth/trap captures were sampled for larvae in spring 2014 (Figure 6). No larvae were observed at any of the sites.

Egg Mass Sampling

No egg mass sampling was conducted in 2014.

Defoliation

No Douglas-fir tussock moth defoliation was observed in Idaho in 2014.

Conclusions

The DFTM-EWS has been generally effective at predicting outbreaks in northern Idaho. If DFTM populations behave according to past trends, populations can be expected to increase again in approximately five to seven years. The Sharps Canyon site in southern Idaho exceeded the moth capture threshold of 25 moths per trap. Defoliation is possible in that area within the next several years. This trap site is located on secondary base Endowment land, so treatment is not likely in the event of defoliation. Land managers have been notified, and the area will be monitored for defoliation.

The DFTM-EWS **is not designed nor is it intended** to predict the exact location of future defoliation. Follow-up sampling is conducted in areas that are selected based on historical experience and the potential impact of DFTM defoliation on management objectives. The

defoliation observed in 2010 was not preceded by increasingly higher average trap captures as in the two previous outbreaks; in fact the trap averages did not reach the historic high levels until fall 2011 (the second year of defoliation). The unusual nature of the most recent outbreak illustrates the importance of an integrated sampling plan utilizing pheromone traps, supplemental sampling (larval and egg mass), as well as aerial detection. Characterizing the full extent of the defoliation would have been difficult without an aerial survey, because defoliation occurred in areas that had not experienced outbreaks in the recent past.

Literature Cited

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This survey and report was partially funded by the USDA Forest Service.

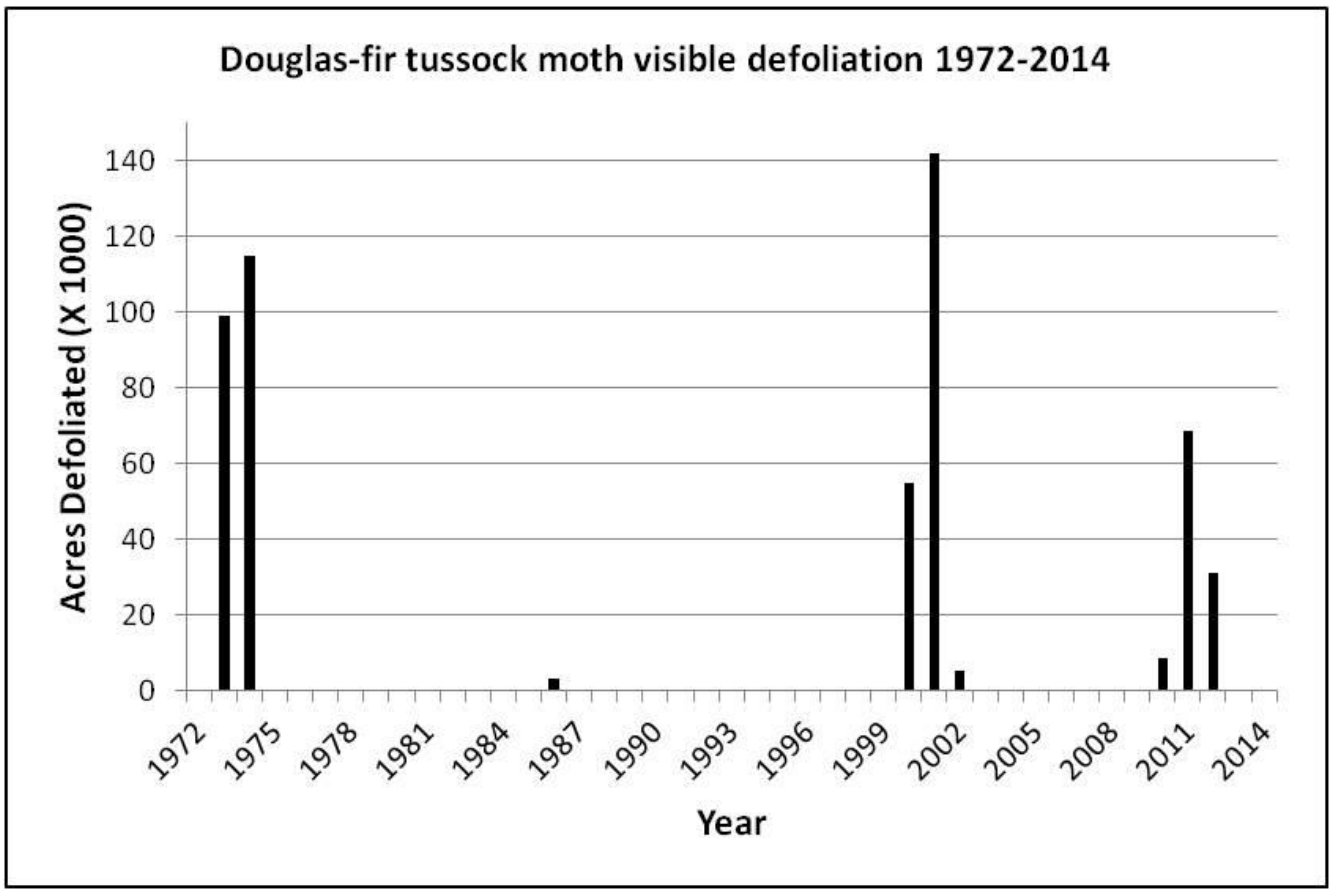

Figure 1. Aerially detected defoliation in northern Idaho from 1972-2014.

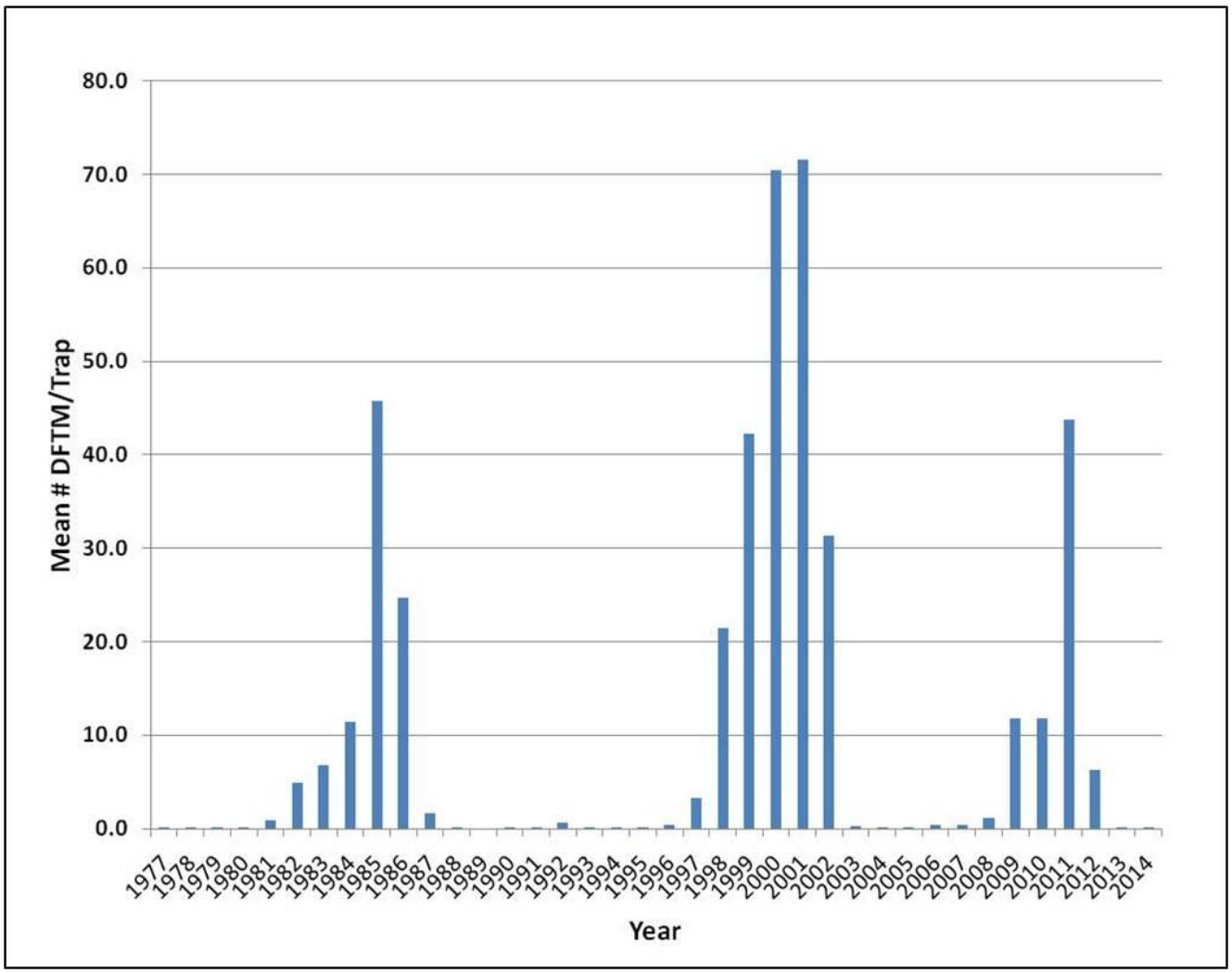

Figure 2. Mean trap catches of Douglas-fir tussock moth on plots monitored by IDL from 1977 through 2014.

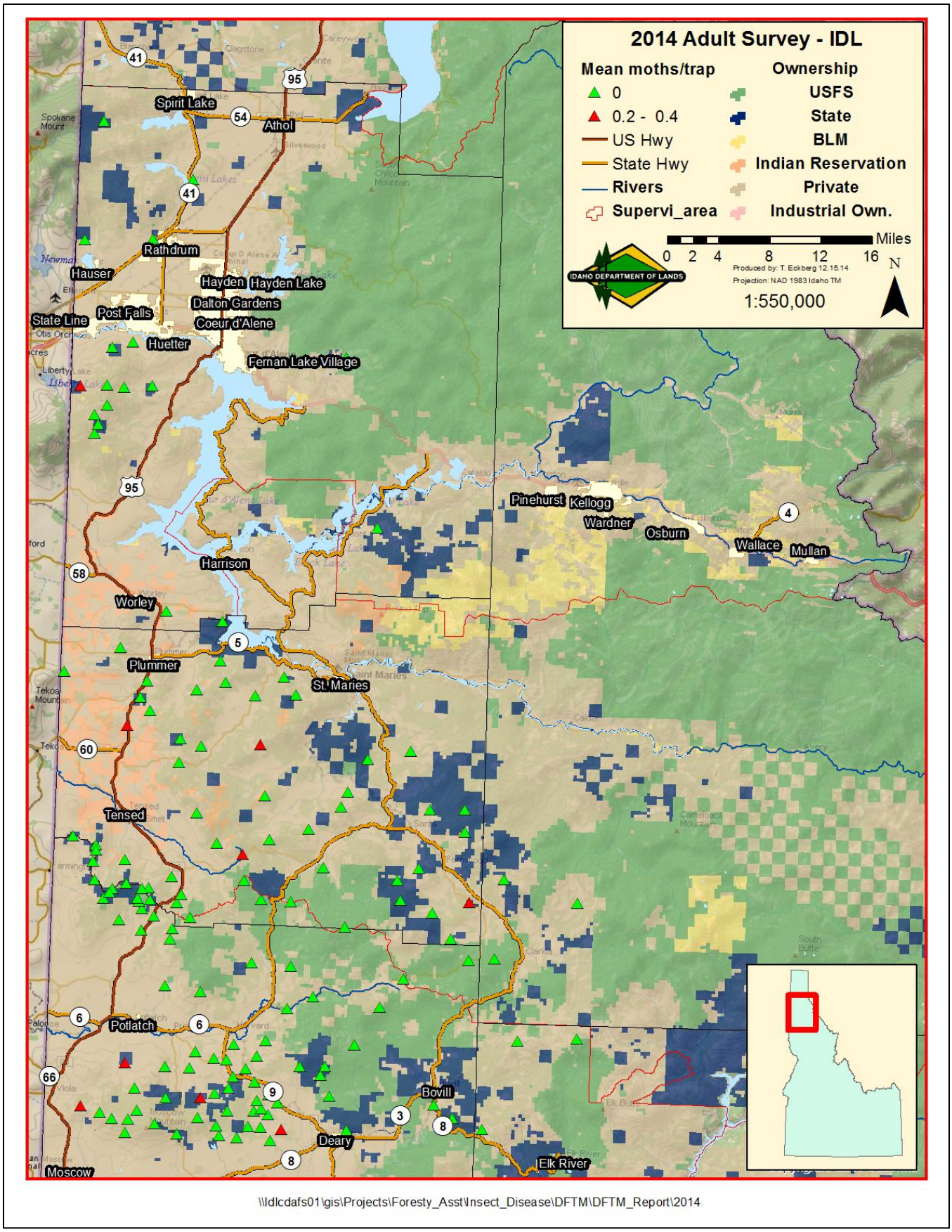

Figure 3. Map of plots trapped by IDL for Douglas-fir tussock moth in 2014.

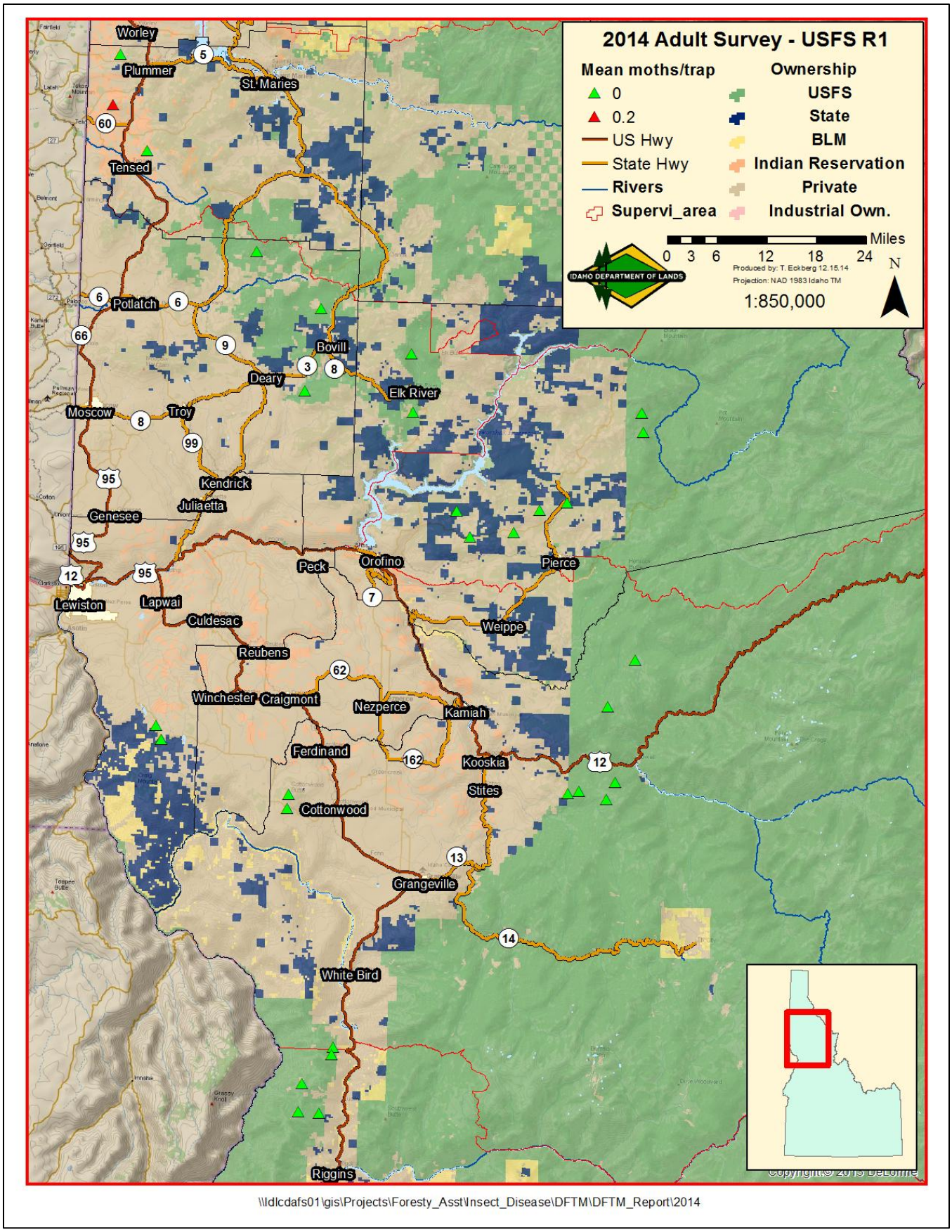

Figure 4. Map of plots trapped by USFS Region 1 for Douglas-fir tussock moth in 2014.

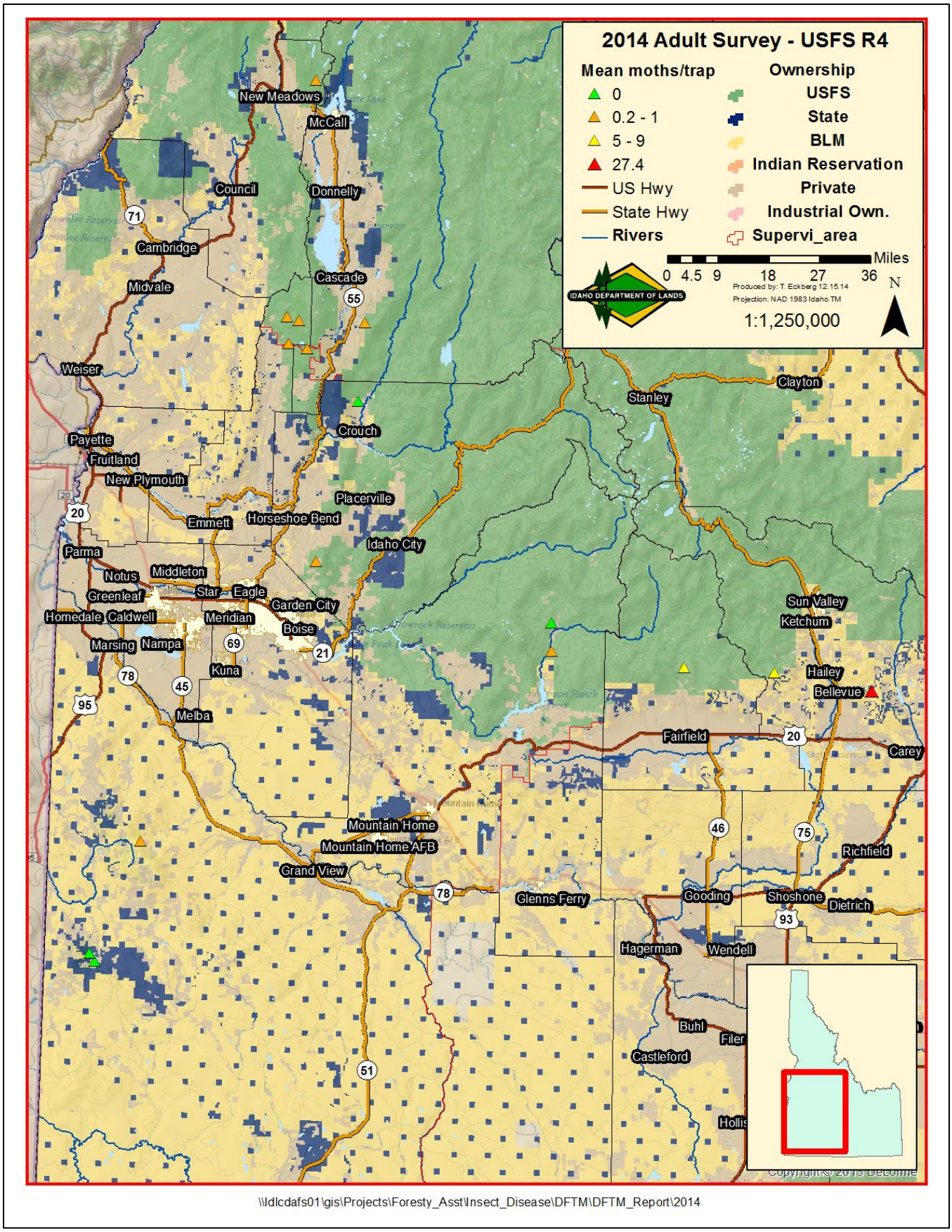

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Figure 5. Map of plots trapped by USFS Region 4 for Douglas-fir tussock moth in 2014.

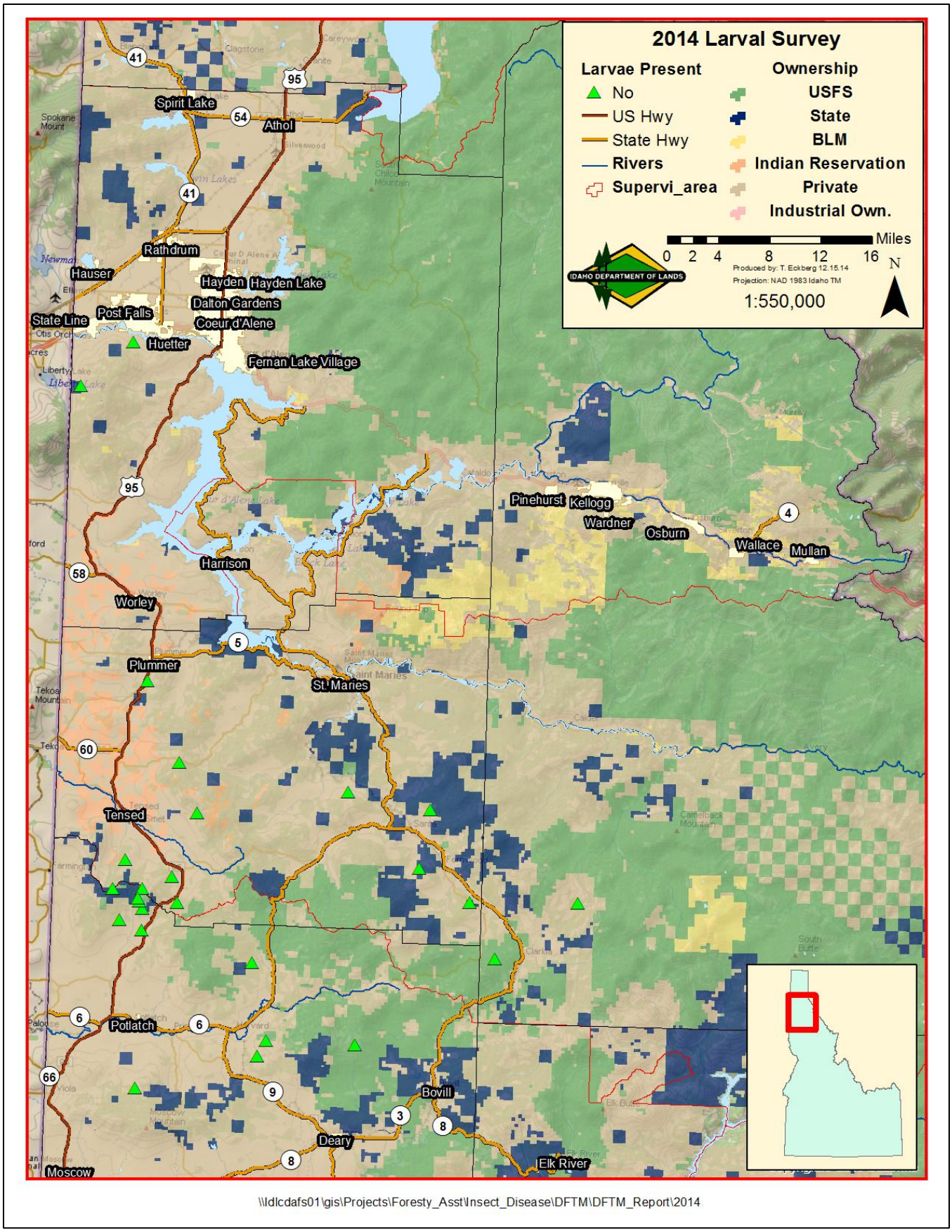

Figure 6. Map of plots surveyed for Douglas-fir tussock moth larvae in 2014.

Appendix 1. 2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
3	Lolo Pass	0‡	0.2‡	26.8	*30.2*‡	*26.4*‡	5.2	0.4	0‡	0	0
4	Charles Butte	0.2	0	0.4	*81.4*‡	*32.2*‡	5.4	0	0‡	0	0
5	Peterson Point	0	0	2.4	*52.8*‡	8.6	2.2	0	0‡	*	0
6	East Dennis	0	0	0.2	*33.2*	2.3‡	9.0	0.2	0.2‡	0	0
7	East Gold Hill	0	0	3.0	*38.0*	2.0	3.4‡	0.8	0‡	0	0
8	Flat Creek	0	0	0.2	*48.0*	8.0	1.0	0.2	0‡	0.4	0
9	Long Creek	0	0	5.0	*56.2*‡	10.2‡	*20.6*‡	3.4‡	3‡	0.2	0
10	Paradise Point	0	0	0.2	*44.6*	9.8	2.0‡	1.2	0.2‡	0.2	0
11	Mineral Mountain	0	0‡	22.2	*11.6*‡	10.8‡	*25.0*‡	4.2‡	0.5‡	0	0
12	Mission Mountain	0	0	5.0	*66.4*‡	8.0‡	*20.8*	0.6	0.2‡	1.2	0
13	Spring Valley Creek	0	0	0	6.2	1.0	0.6	0	0‡	*	0
14	Vassar Meadows	0	0	1.0	*53.6*‡	17.0‡	12.8	0‡	0.4‡	0	0
15	Fairview Knob	0	0‡	8.2	*86.4*	6.6‡	9.2‡	0.8‡	0.4‡	0	0
21	West Twin	0	0	0.4	*55.0*‡	4.0‡	5.3‡	1.2‡	0.4	*	0
22	Moscow Mtn	0	0	*0.2*	17.0	0.0	3.6	0	0	0	0
101	Benewah	0	0	1.0	*51.4*‡	16.4‡	5.0	0	0.2‡	1.4	0
102	Windfall Pass	0	0‡	10.4	*83.0*‡	*29.4*‡	*32.0*‡	12.5‡	0.75‡	0.6	0
103	Squaw Creek	0‡	0‡	23.6	*41.0*	2.6	1.8	0	0	*	0
104	Moses Mountain	0	0‡	10.2	*51.8*‡	7.5	3.4	0.2	0	0	0
105	Little John Creek	0	0	1.6	*51.2*	0.0	2.2	0‡	0.6	0	0
106	Emida Peak	0	1.0	2.5	*65.8*	1.4	1.6	0‡	0.4	0	0
107	N.-South Ski Area	0	0	1.4	*74.8*	2.3	m	0	0	0	0
108	Bald Mountain	0	0	*	*	*	*	*	*	*	0
109	Laird Park	0	0	0.2	*42.0*	1.4	2.2	m	0	0	0
110	N Fk Palouse River	0	0	0	12.0	0.0	0.4	0	0	0	0
111	Mica Mountain	0	0	3.2	*63.2*	16.6‡	20.8	0.2	0.2	0	0

*Indicates Sites Not Trapped m indicates traps missing ‡ Indicates larval survey *Italics indicates egg mass sample*

Appendix 1. (continued)2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
112	Schwartz Creek	0	0	2.6	*59.4*	16.2‡	7.0	0.4	0	0	0
113	Big Bear Creek	0.2	0	3	*39.8‡*	15.2‡	11.6‡	1.8‡	0.6‡	0.6	0
114	Big Meadow Creek	0	0	0.2	*41.5*	0.8‡	0.4	0	0‡	0.2	0
115	East Twin Mountain	0	0	0	*66.8*	6.8	5.4‡	1.2‡	0.4‡	0.2	0
116	Crane Point	0	0	*3.8*	*43.0*	6.8	0	0.2	0	*	0
117	Sheep Creek	0‡	0.2	1.8	*50.8‡*	*21.0‡*	*20.8‡*	2.0	0‡	0.2	0
118	W. Fork Mission Ck	0	0	1.8	*64.2*	7.0‡	6.8‡	1.4	0.2	*	0
119	1 Mi N. Mineral Mt	0	0	*43.6*	*61.6‡*	*24.6*	2.2	0.2	0	*	0
200	2 mi W of Plummer	0	0	4.8	*28.8‡*	7.0‡	*34.2‡*	2.2‡	2.6	*	0
201	Coon Creek	0	0‡	9.8	*97.4‡*	18.0‡	21.8‡	1.8‡	3‡	2	0
202	3 mi E of Benewah	0.2	0	*	*	*	*	*	*‡	0.2	0
203	Benewah Point	0	0	0.6	*47.0*	8.4	3.4	0‡	0.4	*	0
204	John's Point	0‡	0.2	*	*	*	*	*	*	*	0
205	3 m E Charles Butte	0	0	2.2	*52.4*	6.5	2.0	0‡	0.8‡	0	0.2
206	Sunset Mountain	0	*	*	*	*	*	*	*	*	0
207	W Fork Emerald Ck	0	0	0.2	*4.6*	0.0	0.4	0.2	0	*	0
208	Cedar Butte	0‡	0.2	0	*41.4*	1.4	0.4	0	0	*	0
209	Abes Knob	0	0	0.2	*54.4*	5.6	2.4	0.2	0.2	*	0
210	West Fork Deep Creek	0‡	0‡	*37.8*	*83.2‡*	*29.6*	4.6	0	0.2‡	0.2	0
211	Cherry Butte	0	0	0.2	*55.4*	2.8	0.6	0	0‡	0	0
212	Jackson Mountain	0	0	0	*15.4*	1.6	1.0‡	1.0	0.2	*	0
216	1 mi NW of Mineral Mtn	0‡	0.4‡	*47.4*	*70.6‡*	*27.6‡*	*32.4‡*	0.8	0‡	0.4	0
217	Head of Sheep Creek	0	0‡	*33.4*	*38.4‡*	*8.8‡*	*36.8‡*	7.8	0‡	0.2	0
300	Mission Mountain (#2)	0	0	4.0	*38.8‡*	13.8‡	*22.4‡*	2.2	0	0.4	0
301	1.5 mi S of Mineral Mtn	0‡	0‡	*81.0*	*66.6‡*	*62.8‡*	37.6‡	2.4	0‡	0.2	0
302	Mid. Fork of Deep Ck 1	0‡	0‡	*75.8*	*61.6‡*	48.6‡	*38.0‡*	3.6‡	1	*	0

*Indicates Sites Not Trapped m indicates traps missing ‡Indicates larval survey *Italics indicates egg mass sample*

Appendix 1. (continued) 2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
303	Mid. Fork of Deep Ck 2	0‡	0.2‡	*33.8*	*71.6*‡	*27.2*‡	*33.0*‡	1.6	0.2	0.4	0
400	3 mi S of Mineral Mt	0	0‡	*28.0*	*42.8*‡	*23.8*	1.0	0‡	0.6‡	0.2	0
401	Flynn Butte	0	0	1.2	*41.6*	3.4	0.6	0	0	0	0
402	2 mi SE of Browns Mdw	0	0	2	*43.2*	3.0	4.8	0	0.2‡	0.2	0
500	3 mi SW of Harvard	0	0	1.4	*45.0*‡	13.4	1.0	0	0‡	0.2	0
501	3 mi S of Moon Hill	0	0	0.2	*48.6*	*1.4*	1.0	0	0	*	0
502	3 mi W of Crane Point	0	0	1.4	*71.8*‡	15.2‡	6.2	0	0.2	*	0
503	3 mi N of Stanford Point	0	0‡	13.0	*50.0*‡	17.5‡	17.6‡	1.0‡	1	*	0
504	2 mi N of Stanford Point	0	0	1.4	*49.6*‡	12.2‡	10.2	0.0	0‡	0.4	0
505	1 mi SW of Stanford Pt	0	0	0.8	*47.2*	4.5‡	9.2‡	1.6	0.2‡	*	0
506	1 mi S of Stanford Pt	0	0	3.0	*50.4*	5.8‡	*44.4*‡	4.0‡	1	*	0
507	1 mi NE of Stanford Pt	0	0	0	*17.6*	1.6	2.0	0.8	0	0	0
508	1 mi W of Stanford Pt	0	0	6.4	*52.8*‡	*23.4*‡	*27.0*	0‡	0.4	0.2	0
509	2 mi NW of Stanford Pt	0	0	1.6	*45.4*‡	13.8‡	*26.6*‡	0.8‡	1.2‡	0.6	0.2
510	Moon Hill	0	0‡	12.8	*53.6*‡	*36.0*‡	18.2‡	1.2	0‡	0.2	0
511	2 mi SE of Moon Hill	0	0‡	12.0	*47.8*‡	*20.4*‡	*21.0*‡	2.4	0	*	0
512	3 mi S of Mineral Mtn	0‡	0.2‡	*17.2*	*70.8*‡	5.6‡	9.4	0	0	*	0
513	2 mi SW of Moon Hill	0	0	3.4	*55.4*‡	13.0	1.2	0‡	1.4	*	0
514	1.5 mi NW of Avon	0	0	2.8	*42.8*	6.2	3.0	0	0	*	0
600	3.4 mi NNW of Princeton	0	0	0	*38.8*	4.8	4.0	2	0.25‡	*	*
601	Macumber Meadows	0‡	0.2	0.8	*52.2*	1.6	0.6	0	0‡	*	*
602	S of Shay Hill	0	0	0.4	*1.4*	0.2	4.4‡	1.2	0.2	*	*
603	3 mi. S of Chatcolet	0	0	5.0	*101.8*‡	10.8‡	*29.2*‡	3.6	0	*	*
701	Fourmile Creek	0.4	0	0.2	*53.0*‡	*28.2*‡	12.2‡	2.2‡	0.4	*	0
702	North of Granite Point	0	0	1.2	*40.8*‡	10.2	3.4	0.6	0	*	0
703	Bergs Creek	0	0	0.2	12.4	3.2	2.4	0	0	*	0

*Indicates Sites Not Trapped m indicates traps missing ‡ Indicates larval survey *Italics indicates egg mass sample*

Appendix 1. (continued) 2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
704	West Fork Big Bear Ck	0	0	0.6	*49.6*	8.8‡	9.4‡	0.8	0‡	0.2	0
705	2 Mi NW of Stanford PT	0	0‡	18.2	*53.2*‡	*34.2*‡	*43.0*‡	3.0‡	1.5‡	0.8	0
706	1 Mi S. of Iron Mtn	0	0	0.4	*77.2*‡	*27.8*	2.0	0.2‡	0.8‡	*	0
707	Iron Mtn	0	0	*	*	*	*	*	*	*	0
708	Little Bear Creek	0	0	2.2	*46.6*‡	12.4‡	7.3	0‡	0.4‡	*	0
709	Ruby Creek	0‡	0.2‡	10.0	*47.2*‡	10.6	2.4‡	4.0	0	*	0
710	Turnbow Creek	0	0‡	*16.2*	*53.8*‡	*33.0*‡	15.8	0‡	2.4‡	1.4	0
711	East Fork Flat Creek	0‡	0.4‡	12.2	*55.4*‡	*20.8*‡	17.6	0‡	2‡	2.6	0
712	Turnbow Point	0	0	0.2	*37.4*‡	1.2	0.2	0.4	0.2	*	0
713	3 Mi S. of Potlatch	0.2	0	0.6	*47.8*	13.0‡	8.8‡	5.8	0‡	*	0
714	Rocky Point	0‡	0.4‡	*23.4*	*20.6*‡	*25.6*‡	*46.6*	0‡	0.8	*	0
715	Hatter Creek	0	0	0	11.6	0.0	0.2	0	0‡	0.6	0
716	Head of Hatter Creek	0	0	0	*48.2*	0.4	0	0	0	*	0
717	Nora Creek	0	0	0.2	*14.2*	0.2	0.2‡	1.4	0	*	0
718	Crummaring Creek	0	0	0	*49.0*‡	13.6‡	6.4	0.4	0.2	*	0
719	Basalt Hill	0.2	0	3.4	*47.2*‡	10.4‡	7.3	1.2	0.2	*	0
720	Browns Meadow	0	0	3.4	*55.8*‡	*30.0*‡	18.2	0‡	0.4	0	0
721	Smith Creek	0‡	0.2	2.2	*46.6*	2.6	0	0.4	0	*	0
722	Prospect Peak	0	0	3.6	*47.4*‡	*14.4*	2.8	0.4	0	*	0
723	W Fork Mission Creek	0‡	0.4‡	15.4	*50.4*‡	15.8‡	*38.4*	0	0	*	0
724	Huckleberry Mtn	0	0	1.4	*75.0*‡	*30.2*‡	14.8	0.2	0‡	*	0
725	North Fork Pine Creek	0	0	1.4	*62.4*‡	*43.6*‡	13.6‡	1.2‡	0.75	*	0
726	Mineral Creek	0‡	0.3	*25.6*	*65.4*	5.4‡	10.4	0	0	*	0
727	South of Sanders	0	0‡	29.2	*59.8*	3.6	0.8	0	0	*	0
800	Mason Butte	0	0‡	8.8	*5.4*	13.2‡	*38.2*‡	9.0‡	7.25	*	*
801	1 m SW Moctileme Butte	0.2	0	5.5	*21.4*‡	6.8‡	9.8‡	2.8	0.2	*	*

*Indicates Sites Not Trapped m indicates traps missing ‡Indicates larval survey *Italics indicates egg mass sample*

Appendix 1. (continued) 2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
802	1.9 mi S of Plummer	0‡	0.2	2.4	*80.0*‡	*40.0*‡	*39.6*‡	1.6	0	*	*
803	Little Plummer Creek	0	0‡	10.6	*115.4*‡	*14.2*‡	*57.0*‡	17.6‡	5.8	*	*
804	Syringa Creek	0	0	0.4	11.0	1.3	0.4	0	0	*	*
805	John Point	0	0	*	*	*	*	*	*	*	*
806	2 mi W of Pettis Point	0	0	0.8	*36.6*	3.6	0.4	0.2	0	*	*
807	Davis Creek	0‡	0.4	0.2	*26.4*	3.0	m‡	1.0	0	*	*
808	Renfro Creek	0	0	0.0	*37.8*	3.0	0.4	0	0	*	*
809	Crystal Creek	0	0	0.4	*9.8*	0.6	0.4	0	0.2	*	*
810	Child Creek	0	0	0.8	*25.2*	0.6	0.6	0.2	0	*	*
811	Hobo Pass	0‡	0.4	2.2	*13.6*	2.5	m‡	2.4‡	0.6	*	*
812	Hemlock Butte	0	0	0.2	*37.0*	1.8	0.5	0.2‡	0.4	*	*
813	Carpenter Peak	0	0	0.0	*12.6*	3.6	1.6	0	0	*	*
814	Tyson Creek	0	0	0.6	*1.4*	1.0	2.8	0	0	*	*
815	Heinaman Creek	0	0	0.0	*2.4*	0.6	m	0.6	0	*	*
816	Green Mtn	0‡	0.4	2.2	*38.4*	4.8‡	5.2	0.4	0	*	*
817	Willow Creek	0.4‡	0.2	2.8	*32.0*	1.4‡	6.2‡	2.6‡	1.2	*	*
818	Head of Emerald Ck	0	0	2.0	*46.4*	5.8	3.6	0	0.6	*	*
819	East Fork Emerald Ck	0	0	0.4	*2.6*	1.0	0.2	0	0	*	*
820	Head of Bobs Creek	0	0	0.4	9.8	2.0	0.6	0	0	*	*
821	E Fk of Potlatch River	0	0	0.4	*50.8*	5.0	3.8	0.2	0	*	*
822	Head of Moose Creek	0‡	0.2‡	9.2	*45.6*‡	14.8	2.2	0	0.2	*	*
823	Beals Butte	0	0	0.4	*58.2*	1.2	2.2	0	0	*	*
900	Hauser	0	0	0.8	6.0	1.8	2.4‡	1.4	*	*	*
901	Cougar Bay	0	0	0	*29.4*	*6.4*‡	5.2‡	1.4	*	*	*
902	Marie Creek	0	0	0.3	2.3	2.0	1.2‡	0.8	*	*	*
903	Canary Creek	0	0	0	12.8	3.8	2.8	0	*	*	*

*Indicates Sites Not Trapped m indicates traps missing ‡Indicates larval survey *Italics indicates egg mass sample*

Appendix 1. (continued) 2005 to 2014 Douglas-fir tussock moth trap results at IDL monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
904	Rathdrum	0	0	0	23.2‡	17.2	2.6	*	*	*	*
905	State Line (Post Falls)	0.2‡	0.2	0	6.6	0.6	2.0	*	*	*	*
906	Sig. Point (Post Falls)	0	0	0.4	*3.2*‡	9.4‡	41.8	*	*	*	*
907	Blake Draw Creek	0	0‡	11.8	*27.4*‡	6.6‡	7.0	*	*	*	*
908	Coon Creek	0	0‡	11.0	*47.4*‡	*33.2*‡	*71.6*	*	*	*	*
909	Heyburn Park	0	0	1.6	*56.4*‡	11.4‡	9.6	*	*	*	*
910	Coyote Lane PF	0‡	0.2	0.2	*54.0*‡	18.6‡	*67.6*	*	*	*	*
911	State Line (Meredith)	0	0	0.4	*58.8*‡	14.4‡	23.2	*	*	*	*
912	Lovell Valley	0	0	5.6	*65.8*‡	*55.2*‡	*69.6*	*	*	*	*
913	Twin Lakes	0	0	0.2	*66.8*‡	*35.6*	*	*	*	*	*
914	McGovern Tree Farm	0	0	0.2	*4.6*	*	*	*	*	*	*
915	Signal Point #1	0	0	0	*39.4*‡	*	*	*	*	*	*
916	Signal Point #2	0	0	0	*54.2*‡	*	*	*	*	*	*
917	Signal Point #3	0	0	0	*22.8*‡	*	*	*	*	*	*
918	Signal Point #4	0	0	0	*60.0*‡	*	*	*	*	*	*
919	Signal Point #5	0	0	0	*35.4*‡	*	*	*	*	*	*
920	Spirit Lake	0	0	0	*10.8*	*	*	*	*	*	*
	Number of Sites Trapped:	**146**	**146**	**141**	**141**	**134**	**133**	**124**	**120**	**51**	**98**
	Average Number of Moths per Plot:	**0.02**	**0.05**	**6.3**	**43.8**	**11.8**	**11.9**	**1.1**	**0.4**	**0.3**	**0**

*Indicates Sites Not Trapped m indicates traps missing ‡ Indicates larval survey *Italics indicates egg mass sample*

Appendix 2. 2005 to 2014 Douglas-fir tussock moth trap results for USFS-R1 monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
1-1	Lodge Pt	0	0	0	2.2	0.2	3.0	0.0‡	0.0	0.0	0.0
1-3	Pine Knob	0	0	0	41.8	8.6	16.4	0.0‡	0.2	0.3	0.0
1-4	Potato Hill	0	0	0	18.6	0.4	1.4	0.0‡	0.0	0.0	0.0
1-5	Big Tinker	0	0	0	4.6	0.2	0.0	0.0‡	0.0	0.2	0.0
2-1	Rhett Cr	0	0	0	0.2	0.0	0.0	0.3§	0.0	0.0	0.0
2-2	Christie Cr	0	0	0	4.6	1.6	1.4	0.7§	0.0	0.0	0.0
2-3	Cow Cr Saddle	*	*	*	*	*	*	*	*	*	0.0
2-4	Low Saddle	*	*	*	*	*	*	*	0.0	0.4	0.0
2-5	S. Cow Cr	0	0	0	0.2	0.8	1.4	0.0§	0.0	0.0	0.0
2-6	Spring Mtns	0	0	0	0	0.0§	1.4	0.0§	0.0	0.0	*
2-7	Crook's Corral	0§	0	0	0.2	0.4	*	*	*	*	*
3-1	Keuterville	0§	0	0	3.8	1.2	0.4	0.0§	0.0	0.0	0.0
3-2	Cottonwood Butte	0	0	0	0.4	0.2	0.4	0.0‡	0.0	0.0	0.0
4-1	Lake Waha	0	0	0	1.6	0.0	0.0	0.0§	0.0	0.0	0.0
4-2	Black Pine	0	0	0	3.4	0.6	4.0	1.3‡	0.2	0.0	0.0
4-3	Junction	*	0	0	1	0.8	0.8	0.0§	0.0	0.0	0.0
4-4	Captain John	*	0	0	0.8	0.0	1.0	0.3§	0.0	0.0	0.0
4-5	Webb Cr	*	*	*	*	*	*	*	0.0	0.0	0.0
4-7	No Name	0	0	0	4.6	1.2	9.4	0.0§	*	*	*
5-1	Johnson	*	*	*	*	*	*	*	*	0.0	0.0
5-2	Angel Butte	0	0	0	0.6	0.2	0.6	0.0	*	0.0	0.0

* Indicates Sites Not Trapped m indicates missing traps ‡ Indicates 4 traps/site § Indicates 3 traps/site

Appendix 2. (continued) 2005 to 2014 Douglas-fir tussock moth trap results for USFS-R1 monitored sites.

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
5-3	Grangemont	0	0.2‡	0	9.6	1.2	1.0	0.8	1.4	1.4	0.0
5-4	Bargamin Ck.	0	0	0.2	14	m	2.0	0.6	4.6	0.0	0.0
5-5	Bald Mtn	0	0	0§	10.4	1.2	1.6	0.2	3.4	1.8	0.0
5-6	Summit Landing	0	0	0	0.6	1.2	1.8	1.0	3.2	0.6	0.0
5-7	Shin Pt	0	0	0	3	1.0	0.2	0.3	0.0	0.0	0.0
5-8	Swanson Ck.	0	0	0	2.4	0.8	0.8‡	0.4	0.8	0.6	0.0
5-10	Cooper	*	*	*	*	*	*	*	0.0	0.0	0.0
5-11	Cook Ck.	*	0	0	2.8	2.0‡	3.6	*	*	*	*
5-12	Whiskey Ck.	*	0	0	3	0.0	1.0	*	*	*	*
6-1	Canyon Jct	0‡	0	0	13.2	0.4	1.2	0.3‡	0.4	0.0	0.0
6-2	Fan saddle	*	*	*	*	*	*	*	0.0	0.0	0.0
6-3	Mud Cr.	0	0	0	1	0.8	0.0‡	0.0	*	*	*
7-1	Laird Park	*	*	*	*	*	*	0.0	0.2	0.0	0.0
7-2	Little Bald Mt	0	0	0.2	61.6	1.4	3.6	*	0.0	0.0	0.0
7-3	Little Boulder Cr.	0	0	0.2	7.8	2.2	1.0	0.2	0.0	1.2	0.0
7-4	W. Fk Potlatch	0	1.0	0.2	8.6	2.0	1.2	0.8	0.0	0.8	0.6
7-5	Elk Cr Falls	0	0	0.2	0	1.8	2.0	0.8	0.2	0.4	0.4
7-6	Morris Cr.	0	0.8	2.0	16.8	m	1.4	0.8	0.0	0.2	0.0
8-1	Rose Cr.	0	0	2.3§	*	*	*	*	*	*	*
8-2	Wise Lane	0.2	0	1.6	*	*	*	*	*	*	*
8-3	Old Tensed Ln	0	0	1.4	*	*	*	*	*	*	*
	Number of Sites Trapped:	**31**	**35**	**35**	**32**	**32**	**31**	**29**	**31**	**33**	**33**
	Mean Number of Moths per Site:	**0.006**	**0.06**	**0.2**	**7.61**	**1.08**	**2.06**	**0.30**	**0.47**	**0.24**	**0.03**

* Indicates Sites Not Trapped m indicates missing traps ‡ Indicates 4 traps/site § Indicates 3 traps/site

Appendix 3. **2008 to 2014 Douglas-fir tussock moth trap results for USFS-R4 monitored sites**

		Mean Number of Moths per Trap									
Plot #	Site Name	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
1	South Fork Boulder Creek	0	0.6	0.5	0.4	0	0.2	0.2	*	*	*
2	Mill Creek	0	1.6	1	0	0.2	0.2	0.2	*	*	*
3	New York Summit	0.4	3.2	1.2	0.6	0	1.6	1.2	*	*	*
4	Baldy Mt.	*	*	*	0	0.2	0.8	1	*	*	*
5	Upper Wolftone Creek	5	*	*	1.2	0	0.8	1.4	*	*	*
6	Brundage Mt Resort	0.2	*	0	5.4	0.2	1.6	1	*	*	*
7	Bogus Basin Resort	1	*	0.6	0.4	0.2	15.2	15.4	*	*	*
8	Sharps Canyon	27.4	*	2.2	1.8	*	*	*	*	*	*
9	Lower Scriver Cr	0	*	1.4	5.8	*	*	*	*	*	*
10	Paradise Springs	0.2	*	0.2	0.4	*	*	*	*	*	*
11	Lost Man	*	*	*	2.4	*	*	*	*	*	*
12	Couch Summit	9	*	0	0	*	*	*	*	*	*
13	Tamarack Flat	0.2	*	*	*	*	*	*	*	*	*
14	Antelope Trail	0.6	*	*	*	*	*	*	*	*	*
15	Little Sage Hen	0.2	*	*	*	*	*	*	*	*	*
16	Cottonwood	1	*	*	*	*	*	*	*	*	*
17	Skunk Creek	0.4	*	*	*	*	*	*	*	*	*
18	Cow Creek	2.3	*	*	*	*	*	*	*	*	*
	Number of Sites Trapped:	**16**	**3**	**9**	**12**	**7**	**7**	**7**	*****	*****	*****
	Mean Number of Moths per Site:	**2.99**	**1.80**	**0.79**	**1.53**	**0.11**	**2.91**	**2.91**	*****	*****	*****

Red font indicates new trap locations in 2014